

Claims

- [c1] 1.A method for performing diagnostics on a wired drill pipe telemetry system of a downhole drilling system, comprising:
- a)passing a signal through a plurality of drill pipe in the wired drill pipe telemetry system;
 - b)receiving the signal from the wired drill pipe telemetry system;
 - c)measuring parameters of the received signal; and
 - d)comparing the received signal parameters against a known reference for variation thereof whereby a fault in the wired drill pipe telemetry system is identified.
- [c2] 2.The method of claim 1 wherein one of the location, type, existence and combinations thereof of the fault is identified.
- [c3] 3.The method of claim 1 wherein the signal is a wave-form.
- [c4] 4.The method of claim 3 wherein the signal is one of sinusoid, sweep, and combinations thereof.
- [c5] 5.The method of claim 1 wherein the step of measuring comprises measuring one of the voltage, the current and

combinations thereof of the received signal.

- [c6] 6.The method of claim 5 further comprising determining the impedance of the received signal.
- [c7] 7.The method of claim 6 wherein step c) comprises comparing the determined impedance against a known reference to identify at least one resonance therein whereby a fault in the wired drill pipe telemetry system is identified.
- [c8] 8.The method of claim 7 further comprising determining the location of the fault by comparing the determined impedance with an iterative impedance of the known reference.
- [c9] 9.The method of claim 1 wherein the signal is a pulse.
- [c10] 10.The method of claim 1 wherein the received signal is received a time delay after passing the signal.
- [c11] 11.The method of claim 10 wherein step b) comprises measuring one of the time delay, the amplitude, phase and combinations thereof of the received signal.
- [c12] 12.The method of claim 10 wherein step c) comprises comparing characteristics of the time delay of the received signal against the time delay of a known reference to identify a reflection therein whereby the fault is identified.

- [c13] 13. The method of claim 1 further comprising removing at least one of the plurality of wired drill pipe and repeating steps a) d).
- [c14] 14. A method for performing diagnostics on a wired drill pipe telemetry system of a downhole drilling system having a plurality of wired drill pipes, comprising the following steps:
passing a signal through the wired drill pipe telemetry system;
receiving the signal from the wired drill pipe telemetry system;
measuring one of a voltage, a current and combination thereof of the received signal;
determining the impedance of the received signal; and
comparing the impedance of the received signal with the impedance of a known reference to identify a variation therefrom whereby a fault in the wired drill pipe telemetry system is identified.
- [c15] 15. The method of claim 14 wherein one of the location, type, existence and combinations thereof of the fault is identified.
- [c16] 16. The method of claim 14 wherein the signal is a waveform.

- [c17] 17.The method of claim 16 wherein the signal is one of sinusoid, sweep and combinations thereof.
- [c18] 18.The method of claim 14 further comprising removing at least one of the plurality of wired drill pipe and repeating the steps.
- [c19] 19.A method for performing diagnostics on a wired drill pipe telemetry system of a downhole drilling system having a plurality of wired drill pipe, comprising the following steps:
passing a signal through the wired drill pipe telemetry system;
receiving the signal from the wired drill pipe telemetry system, the signal received a time delay after the signal is passed;
determining the time delay of the received signal; and
comparing the time delay of the received signal against the time delay of a known reference to identify a variation therefrom whereby a fault in the wired drill pipe telemetry system is identified.
- [c20] 20.The method of claim 18 wherein the signal is a pulse.
- [c21] 21.The method of claim 18 wherein the variation is a reflection.

- [c22] 22.The method of claim 18 further comprising removing at least one of the plurality of wired drill pipe and repeating the steps.
- [c23] 23.A system for performing diagnostics on a wired drill pipe telemetry system of a downhole drilling system, the wired drill pipe comprising a communication link, comprising:
a signal generator operatively connectable to the communication link of the wired drill pipe telemetry system, the signal generator capable of passing a signal through the communication link;
a gauge operatively connectable to the communication link, the gauge capable of receiving the signal from the wired drill pipe telemetry system and taking a measurement thereof; and
a processor capable of comparing the received signal with a know reference to identify variations therefrom whereby a fault in the wired drill pipe telemetry system is detected.
- [c24] 24.The apparatus of claim 23 wherein the signal generator is integral with the gauge.
- [c25] 25.The apparatus of claim 23 wherein the gauge is one of an impedance analyzer, an oscilloscope and combinations thereof.

- [c26] 26.The apparatus of claim 23 wherein the apparatus is removably connectable to the wired drill pipe telemetry system.
- [c27] 27.The apparatus of claim 23 wherein the apparatus is incorporated into the wired drill pipe telemetry system.
- [c28] 28.The apparatus of claim 23 wherein the signal generator is capable of generating one of a sinusoid, a pulse and combinations thereof.